N92-12838

Stellar Occultations by Planetary Rings: 3 July 1989 28 SGR Occultation by Saturn

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Strategy

To reduce and synthesize near infrared observations of the 3 July 1989 occultation of 28 Sagittarii by Saturn and its rings made from 7 different telescopes spread around the world (2 in Chile, 1 in Hawaii, 1 in Mexico, and 3 in Tucson); and to combine these observations with Voyager data to study the dynamical state of Saturn's rings. This unique event, which occurred 8 years after the Voyager flybys, provides a temporal baseline over which kinematical and dynamical phenomena within the rings may be examined in detail.

Progress and Accomplishments

Observations were successfully made at all 7 sites. Standard aperture photometry was used at 4 of them; rapid, 2-dimensional imaging was used at the remaining 3. The aperture data have all been reduced. The radial positions of roughly 20 sharp-edged ring features, believed to be circular at the 2 km level, have been determined in these data sets. These measurements have been used to refine the event astrometry to the point where ring features may be absolutely located to an accuracy of several kilometers. A paper on the astrometry from this event and its implications for the ring radius scale and Saturn's pole position is now in the final stages of preparation (Hubbard *et al.* 1991). We have already begun to refine the kinematics of Saturn's major eccentric rings by combining previous Voyager imaging and occultation measurements with our ground-based data. A DPS presentation (Turtle *et al.* 1990) has been given on this work.

Substantial progress has been made in reducing the 2-dimensional array imaging data sets. Software for batch-processing (i.e., cleaning, background subtraction, and integration of total stellar flux) of these data have already been accomplished on one data set and will eventually be applied to the remaining two.

Projected Accomplishments

In the following year, I expect to: i) Continue the batch-processing of the remaining 2-dimensional imaging data sets; ii) Continue my work in re-examining the dynamics of Saturn's eccentric features (Porco *et al.*, 1984a, 1984b; Porco 1990; Turtle *et al.*, 1990); search gap edges for edge waves indicative of shepherding satellites; fill out the particle size

distribution; refine our knowledge of Saturn's gravitational harmonics by improving tenfold the precision of ringlet kinematics (Nicholson and Porco, 1988; Turtle *et al.* 1990).

Publications

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